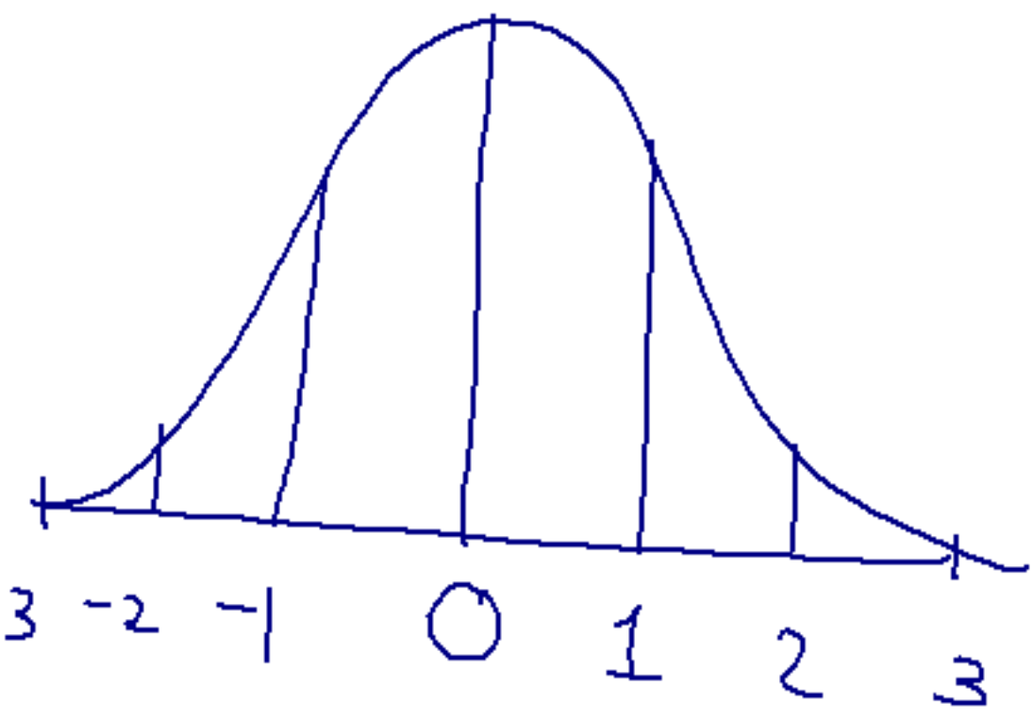
REVIEW:

Testing Proportions

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$$

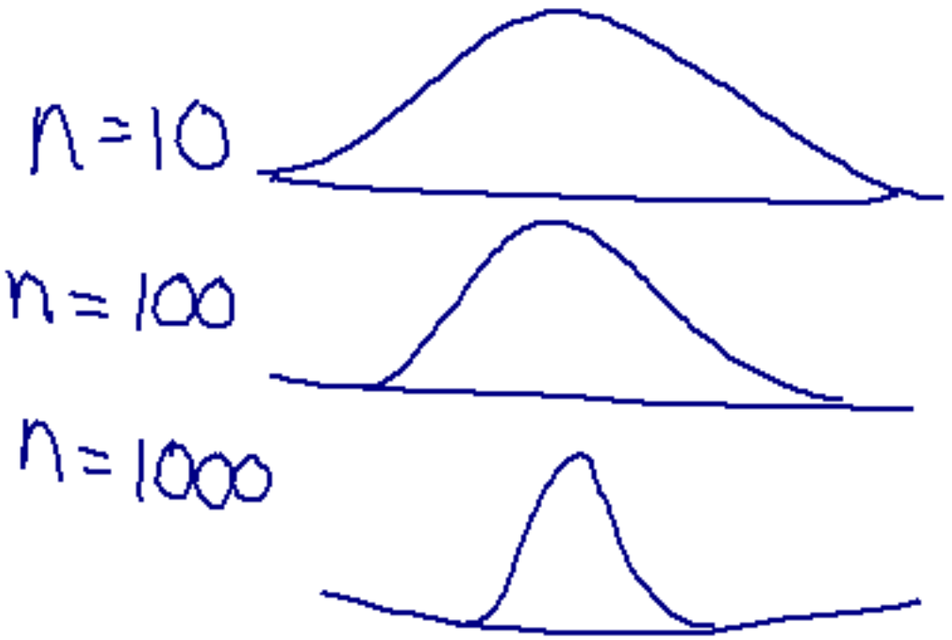
z-distrib.

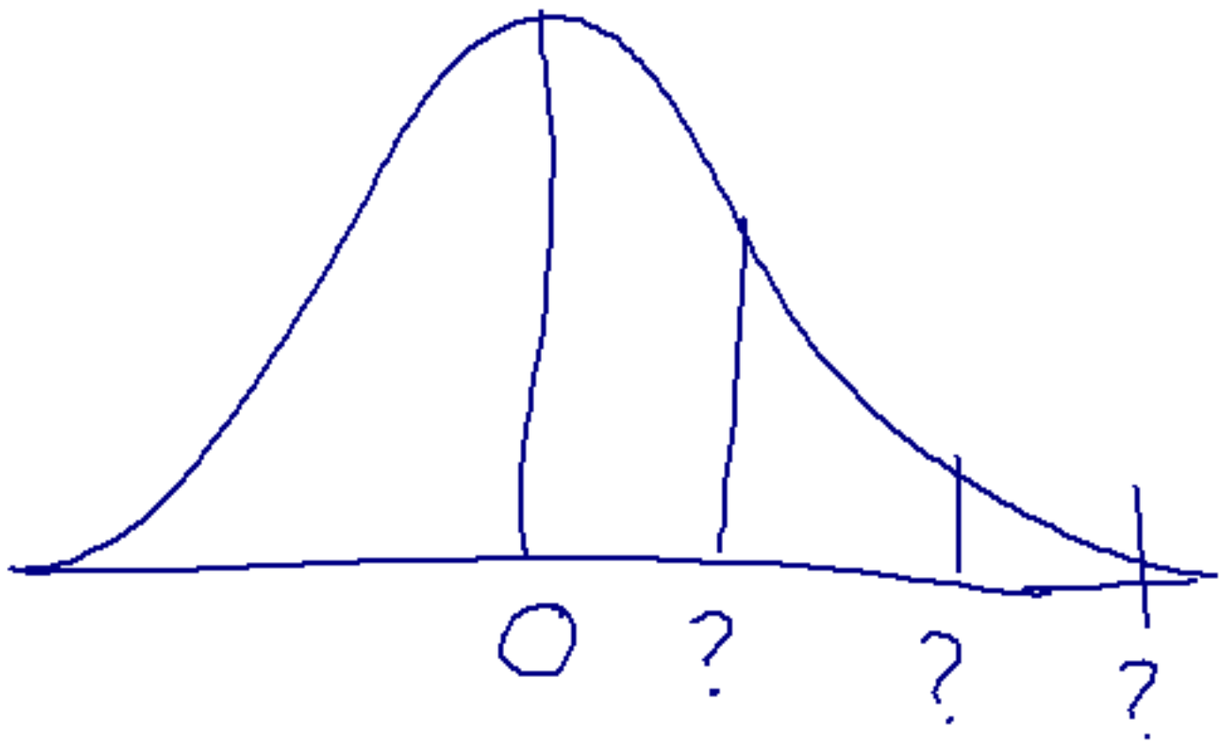


Testing Means (averages):

t-distrib.

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$





* depends on n

NEW: testing full distributions

comparing full chart to expected/claim

Ex: dice:

	1	2	3	4	5	6
Exp	10	10	10	10	10	10
Obs.	12	14	8	7	10	8

Chi-Square Goodness of Fit Test

* Testing whether... a full distribution of #'s fits an expected distrib.

HYPOTHESES: $\mu =$ $p =$

Ho: the observed sample distribution of ↑ fits the expected distrib.

context

Ha: the observed sample distrib. of / doesn't fit the expected distrib.

TEST STATISTIC:

Symbol: χ^2 Called: Chi-Square

Formula:

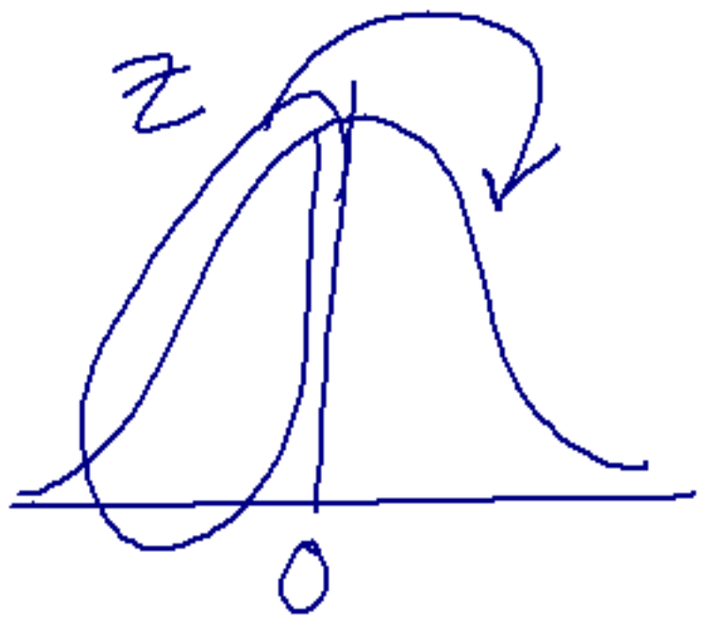
$$\chi^2 = \sum \frac{(\text{observed} - \text{expected})^2}{\text{expected}}$$

Sigma = sum

* do for each outcome
* always positive #
* big #'s

Distrib:

0



df = degrees of freedom

= # of outcomes − 1

Ex: dice 6 − 1 = (5)

P-value

work: $P(\chi^2 > \text{test statistic})$

calculator: $\chi^2\text{cdf}(\text{lower}, \text{upper}, df)$ (E99)

df = degrees of freedom

Always looking positive direction →

Concl.

- We reject/fail to reject....
- We have suff. evid. that (re-copy H_0 or H_a)

Conditions

① SRS

② all expected #'s ≥ 5

#'s

n=300

1 - 15

2 - 45

3 - 30

4 - 45

5 - 15

6 - 150

Ho: the observed sample distr. of dice rolls fits the exp. distr.

Ha: the obs. sample distr. of dice rolls doesn't fit the exp. distr.

Obs	exp	Obs - Exp	$(Obs-Exp)^2$	$\frac{(O-E)^2}{E}$
23	15	8	64	4.2667
50	45	5	25	0.5556
42	30	12	144	4.8
65	45	20	400	8.8889
20	15	5	25	1.667
100	150	-50	2500	16.667

$$\chi^2 = \sum \frac{(obs-exp)^2}{exp}$$

$$\chi^2 = 36.844$$

$\chi^2 = 36.844$

$df = 6 - 1 = 5$

P-value: $P(\chi^2 > 36.844) = 6.435 \times 10^{-7}$

- reject Ho ....

- Suff. evid. that (recopy Ha).